

THREE NEW SPECIES OF *ERIOCAULON* (ERIOCAULACEAE) FROM PENINSULAR INDIA

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ABSTRACT

Three new species of the genus *Eriocaulon* L., two species viz., *E. anshiense* & *E. kanarensis* from Karnataka and one species *E. konkanense* from Maharashtra are described and illustrated. A distribution map has been provided. A key to distinguish these three species from their allied species is also given.

RESUMEN

Tres especies nuevas del género *Eriocaulon* L. son aquí descritas e ilustradas, dos de ellas, *E. anshiense* y *E. kanarensis* encontradas en Karnataka y la tercera *E. konkanense* en Maharashtra. Se proporciona un mapa de distribución de las mismas. Así mismo, se ofrece una clave de identificación para distinguir las, en la que se incluyen también especies próximas.

INTRODUCTION

The genus *Eriocaulon* L. is distributed throughout the tropical and sub-tropical regions of both hemispheres and is estimated to consist of ca. 400 species (Mabberley 1997). Karthikeyan et al. (1989) enumerated 72 species, 14 varieties and 1 forma from India. Ansari and Balakrishnan (1994) rendered a systematic account of the genus in India, wherein 65 species were treated. Subsequently, various workers (Myrthong et al. 1984; Bole & Almeida 1987; Koshi & Pushpangadan 1993; Yadav et al. 1998; Sreedevi & Binoj Kumar 1999; Khanna et al. 2000; Gaikwad et al. 2002; Gaikwad et al. 2003 (pers. comm.); Punekar et al. 2003; Punekar & Lakshminarasimhan 2002; Punekar et al. 2003; Pradeep & Sunil 2003) have added 16 more species to this genus. Gaikwad and Yadav (2002) reported 40 species from Maharashtra and Das and Singh (2001) reported 35 species from Karnataka. Presently, the genus *Eriocaulon* L. is represented by 84 species in India including the three new species described here.

During the course of botanical exploration in the West Coast and Western Ghats of Indian Peninsula, three interesting specimens of *Eriocaulon* were collected. After a perusal of the literature, comparison with herbarium collections

at BSI & K and our own field observations, the specimens were found to be very distinct from other species of *Eriocaulon* and hence have been considered as new species and are described and illustrated here.

1. *Eriocaulon anshiense* Punekar, Malpure & Lakshmin., sp. nov. (Fig. 1, 2A).

TYPE: INDIA. KARNATAKA STATE: North Kanara (Uttara Kannada) District, Anshi National Park, waterfall near Mopai Ghat 600 m, 22 Sep 2003, Punekar 187761 (HOLOTYPE: CAL; ISOTYPES: BSI, MH).

Eriocaulon anshiense *E. eurypeplo* Körn. similis sed capitulis spinulosis griseis, bracteis involucribus plerumque acuminatis, bracteis floralibus ad apicem caudatis, sepalis femineis longe acuminatis atque bracteis florales excedentibus, et seminibus plerumque rostratis difflert.

Acaulescent rosulate herbs, to 21.5 cm high. Roots fibrous. Leaves linear, oblong or lanceolate, broad at base, apex acute or acuminate, glabrous, almost equal to the sheaths, membranous, 9.5 × 0.7 cm. Peduncles solitary or many, up to 21.5 cm long, 4–5 ribbed, broad at apex, twisted, glabrous. Sheaths up to 11 cm long, glabrous; limb lanceolate, acuminate, entire. Heads hemispherical or depressed globose, sometimes with central depression, 7 × 5 mm, grey, spinulate. Receptacles ovoid, with central depression, pilose. Involucral bracts spreading, hidden inside the head, ovate or obovate, usually acuminate, rarely acute, sparsely hoary dorsally, glabrous inside, straw colored, 1.2–1.6 × 0.8 mm. Floral bracts closely imbricated, broadly cuneate, caudate and dorsally hoary towards apex, ventrally glabrous, black-straw colored, hyaline along margin, 2 × 1.2 mm. **Male flowers:** pedicels minute; sepals 2, free, conduplicate, keeled, obtuse or truncate and hoary at apex, straw colored, chartaceous at margin, 0.9 × 1.1 mm; petals 3, equal, ovate to linear, minute, hairy at apex, gland dotted; stamens 6, anther lobes black. **Female flowers:** pedicels short; sepals 2, free, exceeding the floral bracts, obovate to elliptic, conduplicate, deeply keeled, long acuminate, straw colored with black tinge, dorsally hoary towards apex or in upper half, chartaceous along margins, 2.2 × 0.3 mm; petals 3, free, linear, acute, barbate towards apex, gland dotted, glands elongated, hyaline, 1.2 × 0.2 mm; ovary sessile, ovoid, 0.6 × 0.5 mm; style trifid. Seeds ovoid to ellipsoid, brownish, apiculate or obtuse, 0.8 × 0.5 mm, cells of seed coat transversely elongated, aligned in vertical rows, appendages are of different types in the seeds of same plant, 1 from the middle of the transverse radial wall, so that they appear to be in vertical lines on the surface of seeds, setiform, dilated or hooked at apex.

Eriocaulon anshiense is similar to *Eriocaulon eurypeplon* Körn. (Fig. 2B) but differs from the latter in having spinulate and grey heads, involucrial bracts usually acuminate, floral bracts caudate at apex, female sepals long acuminate, exceeding the floral bracts and usually beaked seeds.

Distribution.—The species is so far restricted to few localities of two states viz., water fall near Mopai ghat, Anshi National Park, North Kanara (Uttara Kannada) District, Karnataka State and Usgao, Verlem, Waghai and on the way to Ondoford-Butpal of Goa State (Fig 5).

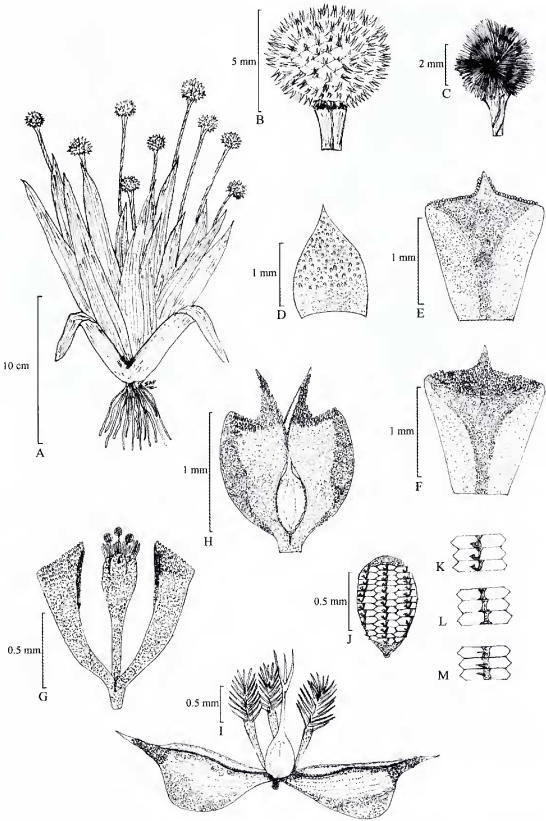


FIG. 1. *Eriocaulon anshiense* Punekar, Malpure & Lakshmin. A. Habit; B. Head; C. Receptacle; D. Involucral bract; E. Floral bract-ventral view; F. Floral bract-dorsal view; G. Male flower; H. Female flower; I. Female flower-sepals spread out to show details; J. Seed; K-M. Portion of seed showing different types of appendages enlarged.



FIG. 2. **A.** *Eriocaulon anshiense* Punekar, Malpure & Lakshmin.; **B.** *Eriocaulon eurypeplon* Kōm.

Habitat and Ecology.—Grows in dense colonies in the shallow depressions on rocky slopes along the streams surrounded by moist deciduous forests. This species is often found associated with *Coelachne perpusilla*, *Drosera burmanni*, *Eriocaulon achiton*, *E. lanceolatum*, *Fimbristylis aestivalis*, *F. dichotoma*, *Indopoa paupercula*, *Rotala malampuzhensis*, *Utricularia reticulata*, *Xyris indica*, etc.

Flowering and Fruiting.—August–December.

Etymology.—The specific epithet of the new species is based on the type locality viz., Anshi National Park of Karnataka State.

PARATYPES: **INDIA. GOA:** on the way to Ondoford–Burpal, 24 Aug 1963, *Kanodia* 89525 (BSI); Usgao, 8 Oct 1964, *Raghavan* 103414 (BSI); Verlem, Bhuta Baicha Dongar, 12 Oct 1970, *Singh* 125358 (BSI), Waghai, without date, *Singh* 124812 (BSI). **KARNATAKA:** North Kanara District: Anshi National Park, Mopai Ghat waterfall 600 m, 7 June 2003, *Punekar & Malpure* 187746 (BSI); same locality, 11 Dec 2003, *Punekar* 187822 (BSI).

2. *Eriocaulon kanarense* Punekar, Watve & Lakshmin., sp. nov. (Fig. 3). TYPE: INDIA, KARNATAKA: North Kanara District, 15 km S of Ankola on Karwar–Mangalore national highway, 2 Sep 2003, *Watve* 187781 (HOLOTYPE: CAL; ISOTYPES: BSI, MH).

Eriocaulon kanarense *E. talbotii* Ansari & N.P. Balakr. similis sed foliis pedunculisque minoribus, vaginis quam foliis longioribus, capitulis albis, lobis sepalorum masculorum truncatis, antheris nigris, petalis femineis ad apicem eglandulosus et seminibus ellipsoideis rostratis differt.

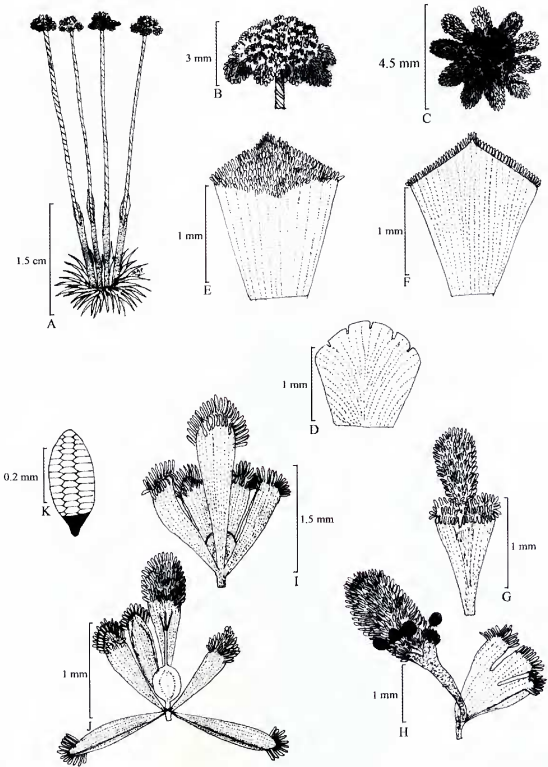


FIG. 3. *Eriocaulon kanarense* Punekar, Watve & Lakshmin. A. Habit; B. Head- lateral view; C. Head- top view; D. Involucral bract; E. Floral bract- dorsal view; F. Floral bract- ventral view; G. Male flower; H. Male flower- sepal spread out to show details; I. Female flower; J. Female flower- sepals spread out to show details; K. Seed.

Acaulescent rosulate herbs, to 3–5 cm high. Roots fibrous. Leaves linear, broad at base, gradually narrowing towards apex, acuminate, pale green, glabrous, shorter than sheaths, 4 nerved, 8×0.6 mm. Peduncles usually 3–4, rarely solitary, up to 4.2 cm long, 5-ribbed, twisted, glabrous. Sheaths up to 1.4 cm long, glabrous; limb lanceolate, acute, entire. Heads hemispherical, 4.5 mm across, white. Receptacles ovoid, glabrous. Involucral bracts spreading, obovate, obtuse and notched at apex, up to 1.5×1 mm, straw colored, glabrous. Floral bracts cuneate, usually acute or rarely cuspidate and densely hoary dorsally at apex, blackish, 1.6×1 mm. **Male flowers:** pedicels minute; sepals obovate, connate into a spathe of 1×0.8 mm, 3-lobed, lobes truncate and densely hairy dorsally at apex, lobes are almost half the length of sepals, black, stipe of corolla 1 mm long; petals 3, unequal, lateral petals minute, hairy at apex, 0.2 mm long, middle odd petal elliptic to oblong, ventrally densely hairy throughout, dorsally glabrous, 1.2×0.8 mm, obtuse at apex; anthers 6, black. **Female flowers:** pedicels short; sepals 3, free, subequal, all densely hoary at apex, oblanceolate to oblong, canaliculate, not keeled, obtuse at apex, black, 1×0.2 – 0.3 mm; petals 3, unequal, all obtuse at apex, ventrally densely hairy at apex, dorsally glabrous, eglandular, spatulate, larger petal 1.8×0.45 mm, laterals 1×0.3 mm; ovary stipitate, globose; style trifid. Seeds ellipsoid, beaked, yellow, dark at one end, 0.4×0.2 mm, cells of seed coat transversely elongated, aligned in vertical rows, appendages absent.

Eriocaulon kanarense is similar to *E. talbotii* Ansari & N.P. Balakr., but differs from the latter in having smaller leaves and peduncles, sheaths longer than leaves, heads white, male sepal lobes truncate, anthers black, female petals eglandular at apex and seeds ellipsoid, beaked.

Distribution.—15 km south of Ankola on Karvar-Mangalore national highway, North Kanara (Uttara Kannada) District, Karnataka State (Fig. 5).

Habitat and Ecology.—Common, forming dense cover on lateritic plateau along coast in moist soil in association with *Ammannia* sp., *Drosera indica*, *Fimbristylis* sp., *Trithuria konkanensis*, *Utricularia reticulata*, etc.

Flowering and Fruiting.—August–November.

Etymology.—The specific epithet of the new species is based on the type locality viz., North Kanara District of Karnataka State.

3. *Eriocaulon konkanense* Puneekar, Malpure & Lakshmin., sp. nov. (**Fig. 4**). TYPE: INDIA. MAHARASHTRA: Ratnagiri District, Plateau near MIDC area, Airport road, 7 Sep 2003, Malpure 187784 (HOLOTYPE: CAL; ISOTYPES: BSI, MH).

Eriocaulon konkanense *E. odorato* Dalzell similis sed capitulis albis, bracteis involucralibus ad apicem incisus, incisuris 2 vel 3 numero, sepalis femineis 2 ad apicem obtusis vel rotundatis, seminibus flavis, muris transversalibus seminorum appendiculas 2–4 ferentibus et mures verticalibus seminorum non appendiculatis differt.

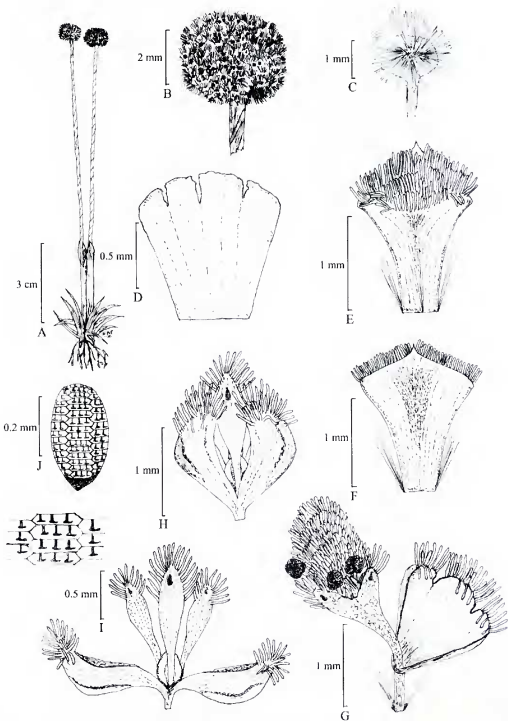


FIG. 4. *Eriocaulon konkanense* Punekar, Malpure & Lakshmin. A. Habit; B. Head; C. Receptacle; D. Involucral bract; E. Floral bract - dorsal view; F. Floral bract - ventral view; G. Male flower; H. Female flower; I. Female flower - sepal spread out to show details; J. Seed; K. Portion of seed showing appendages enlarged.

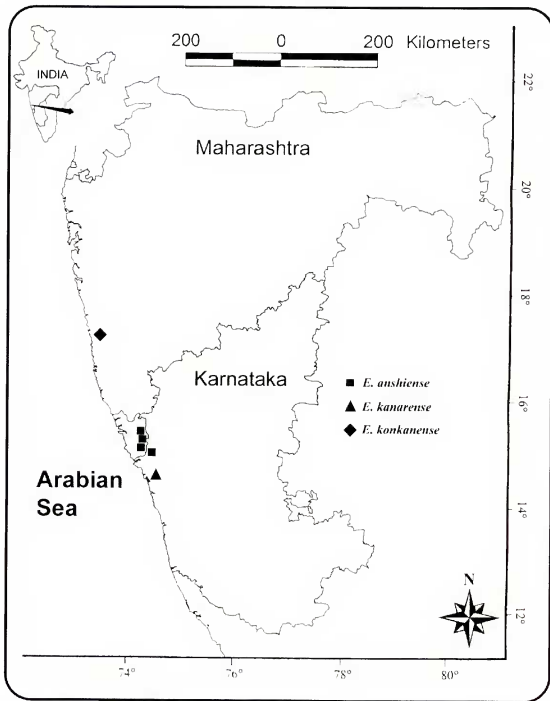


FIG. 5. Distribution map of *Eriocaulon* species.

Acaulescent rosulate herbs, to 16.5 cm high. Roots fibrous. Leaves rosulate, 7–11, linear, broad at the base, tapering towards apex, acuminate, shorter than sheaths, up to 1.7 cm long and 0.25 cm broad, glabrous. Peduncles 1–5, twisted, glabrous, up to 16.5 cm long, 6-ribbed. Sheaths up to 2.7 cm long, glabrous; limb lanceolate, entire, acute. Heads ovoid to quadrangular, 5 mm across, white. Receptacles depressed globose, pilose. Involucral bracts spreading, obovate, rounded and notched at apex, straw colored with blackish tinge, papery, glabrous, 1.2×1 mm. Floral bracts oblanceolate, cuneate, acute to acuminate, dorsally hoary and blackish towards apex, hyaline towards base, 1.8×1 mm. **Male flowers:** pedicels 0.4 mm long; sepals obovate, connate into a spathe of 1.2 mm long and 0.8 mm across, 3-lobed, lobes truncate to obtuse and dorsally hoary at apex, hyaline with slight blackish tinge; stipe of corolla 0.5–0.7 mm long; petals 3, unequal, laterals linear, minute, middle oblong to narrowly elliptic, obtuse at apex, 1×0.3 mm, all densely hoary inside, glabrous outside, gland dotted; stamens 6; anther lobes black. **Female flowers:** pedicels 2–3 mm long; sepals 2, free, oblanceolate, conduplicate, keeled, straw colored with blackish tinge, dorsally hoary and obtuse-rounded at apex, 1.5 mm long; petals 3, free, hyaline, unequal, laterals smaller, 1×0.5 mm, hairy at apex, middle larger, 1.5×0.2 mm, ventrally hoary in upper half, dorsally sparsely hairy at apex, all oblanceolate, obtuse at apex, gland dotted, stipitate between sepals and petals; ovary stipitate, ovoid, 0.2×0.3 mm; style trifid. Seeds ellipsoid, acute, 0.4×0.25 mm, yellow; cells of seed coat transversely elongated, aligned in vertical rows, appendages 2–4 from transverse radial walls, setiform, dilated at apex.

Eriocaulon konkanense is similar to *E. odoratum* Dalzell but differs from the latter in having white heads, involucral bracts notched at 2 or 3 places at apex, female sepals 2, obtuse to rounded at apex, seeds yellow, with 2–4 appendages from transverse walls and none from vertical walls.

Distribution.—This species is so far restricted to the coastal lateritic plateau near MIDC area, Airport road, Ratnagiri district, Maharashtra (Fig. 5).

Habitat and Ecology.—Common on coastal lateritic plateau in association with *Eriocaulon parviflorum*, *Eriocaulon richardianum*, *Exacum pumilum*, *Fimbristylis* sp., *Pentanema indicum*, *Rhamphicarpa longiflora*, *Utricularia reticulata*, etc.

Flowering & Fruiting.—August–November.

Etymology.—The specific epithet of the new species is based on the type locality viz., Konkan Coast of Maharashtra State.

KEY TO NEW SPECIES AND ALLIED SPECIES

1. Sepals of male flowers free.
 2. Heads spinulate; involucral bracts usually acuminate; sepals of female flowers longer than floral bracts _____ **E. anshiense**
 2. Heads not spinulate; involucral bracts usually obtuse or subacute; sepals of female flowers as long as floral bracts _____ **E. euryeplon**

1. Sepals of male flowers connate into a spathe.
3. Petals of male flowers subequal; anther lobes white _____ **E. talbotii**
3. Petals of male flowers unequal; anther lobes black.
4. Sepals of female flowers 2 _____ **E. konkanense**
4. Sepals of female flowers 3.
5. Petals of female flowers subequal, glandular; seeds with appendages _____ **E. odoratum**
5. Petals of female flowers unequal, eglandular; seeds without any appendages _____ **E. kanarense**

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